



Product Description: T315HW02 TFT-LCD SKD PANEL			
91.31T06.000 + 55.31T06.C03 or 55.31T06.C04			
AUO Model Name: T315HW02 V0			
Customer Part No/Project Name:			
Customer Signature	Date	AUO	2009/03/24
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Product Specifications

32" FHD Color TFT-LCD SKD Panel
Model Name: T315HW02

() Preliminary Specifications
(*) Final Specifications



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Record of Revision

Version	Date	No	Old Description	New Description	Remark
0.0	2009/03/04			First Release	
0.1	2009/03/24			Final spec	



1. General Description

This specification applies to the 31.5 inch Color TFT-LCD SKD Panel T315HW02 V0. This LCD open cell unit has a TFT active matrix type liquid crystal panel with 1920x1080 pixels, and its diagonal size is 31.5 inch. This open cell unit supports 1920x1080 HDTV mode (Non-interlace).

Each pixel is divided into Red, Green and Blue sub-pixel or dot which is arranged in vertical stripes. Gray scale or the brightness of the sub-pixel color is determined with an 8-bit gray scale signal for each dot.

The T315HW02 V0 has been designed to apply to 8-bit and 2 channel LVDS interface method. It is intended to support displays where high brightness, wide viewing angle, high color saturation, and high color depth are very important.

General Information

Items	Specification	Unit	Note
Active Screen Size	31.51	inches	
Display Area	698.4 (H) x 392.85 (V)	mm	
Cell outline Dimension	717.585(H) x 411.17(V) x 1.82(D)	mm	
Driver Element	a-Si TFT active matrix		
Display Colors	16.7M	Colors	
Number of Pixels	1920x1080	Pixel	
Pixel Pitch	0.36375	mm	
Pixel Arrangement	RGB vertical stripe		
Display Mode	Normally Black		
Contrast ratio	4000:1		Base on AUO BLU
Brightness	500	nit	Base on AUO BLU
Surface Treatment	AG, 3H		Haze = 11%

2. Absolute Maximum Ratings

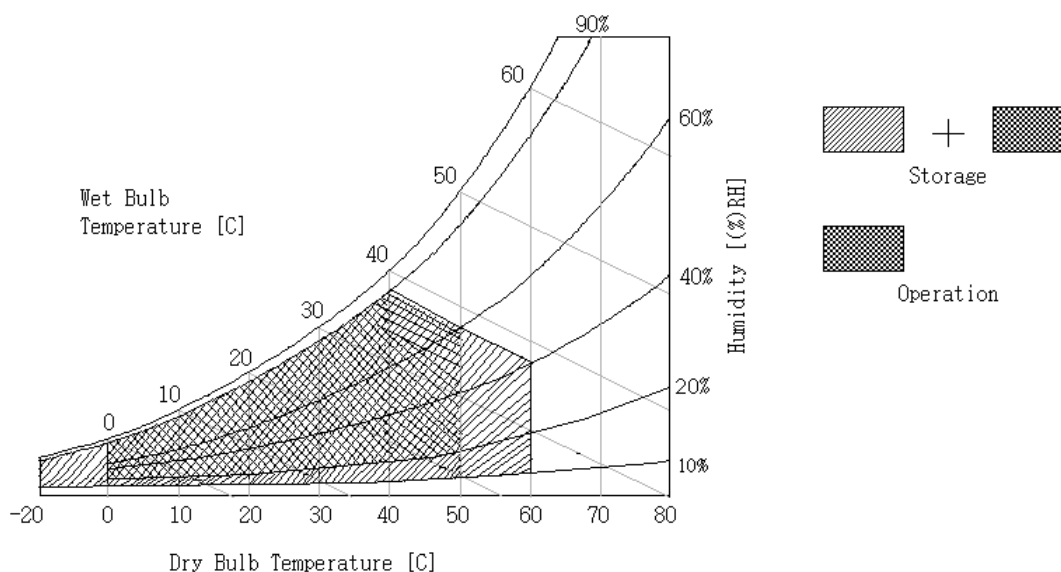
The followings are maximum values which, if exceeded, may cause faulty operation or damage to the unit.

Item	Symbol	Min	Max	Unit	Note
Logic/LCD Drive Voltage	V _{dd}	-0.3	14	[Volt]	1
Input Voltage of Signal	V _{in}	-0.3	3.6	[Volt]	1
Operating Temperature	T _{OP}	0	+50	[°C]	2
Operating Humidity	H _{OP}	10	90	[%RH]	2
Storage Temperature	T _{ST}	-20	+60	[°C]	2
Storage Humidity	H _{ST}	10	90	[%RH]	2

Note :

1, Duration = 50 msec

2, Maximum Wet-Bulb should be 39°C and No condensation.





3. Electrical Specification

The T315HW02 requires two power inputs. One is employed to power the LCD electronics and to drive the TFT array and liquid crystal. An inverter typically generates the second input, which powers the CCFL.

3-1 Electrical Characteristics

Parameter	Symbol	Value			Unit	Note
		Min	Typ	Max		
LCD:						
Power Supply Input Voltage	Vcc	10.8	12	13.2	Vdc	
Power Supply Input Current	Icc	-	0.65	0.75	A	1
Power Consumption	Pc	-	7.8	9	Watt	1
Inrush Current	I _{RUSH}	-	-	6	A	1

Note :

1, Vcc=5.0V, Fv=60Hz, Fclk= 85.0 MHz , 25°C . , Test Pattern : White Pattern



3-2 Interface Connections

Connector on Panel: JAE FI-RE51S-HF (Manufactured by JAE)

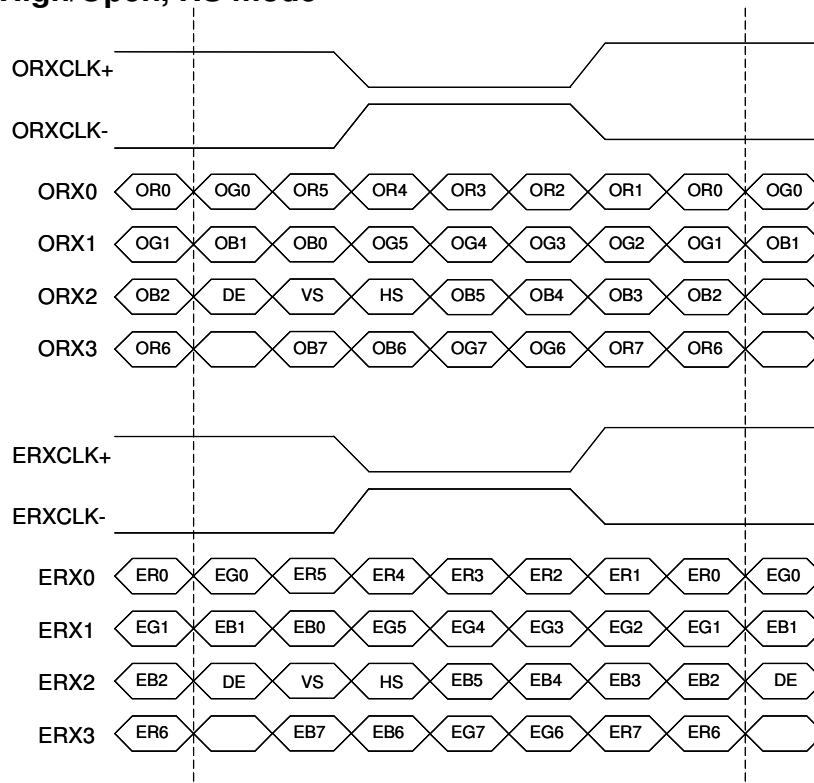
Pin No	Symboal	Description	Pin No	Symboal	Description
1	VCC	+12V, DC, Regulated	27	RE[1]-	Even LVDS Signal -
2	VCC	+12V, DC, Regulated	28	RE[1]+	Even LVDS Signal +
3	VCC	+12V, DC, Regulated	29	RE[2]-	Even LVDS Signal -
4	VCC	+12V, DC, Regulated	30	RE[2]+	Even LVDS Signal +
5	VCC	+12V, DC, Regulated	31	GND	Ground and Signal Return
6	GND	Ground and Signal Return	32	RECLK-	Even LVDS Clock -
7	GND	Ground and Signal Return	33	RECLK+	Even LVDS Clock +
8	GND	Ground and Signal Return	34	GND	Ground and Signal Return
9	GND	Ground and Signal Return	35	RE[3]-	Even LVDS Signal -
10	RO[0]-	Odd LVDS Signal -	36	RE[3]+	Even LVDS Signal +
11	RO[0]+	Odd LVDS Signal +	37	Reserved	Please leave it open
12	RO[1]-	Odd LVDS Signal -	38	Reserved	Please leave it open
13	RO[1]+	Odd LVDS Signal +	39	GND	Ground and Signal Return
14	RO[2]-	Odd LVDS Signal -	40	Reserved	Please leave it open
15	RO[2]+	Odd LVDS Signal +	41	Reserved	Please leave it open
16	GND	Ground and Signal Return	42	Reserved	Please leave it open
17	ROCLK-	Odd LVDS Signal -	43	Reserved	Please leave it open
18	ROCLK+	Odd LVDS Signal +	44	Reserved	Please leave it open
19	GND	Ground and Signal Return	45	LVDS Option	High/Open for Normal (NS), Low for JEIDA
20	RO[3]-	Odd LVDS Signal -	46	Reserved	Please leave it open
21	RO[3]+	Odd LVDS Signal +	47	Reserved	Please leave it open
22	Reserved	Please leave it open	48	Reserved	Please leave it open
23	Reserved	Please leave it open	49	Reserved	Please leave it open
24	GND	Ground and Signal Return	50	Reserved	Please leave it open
25	RE[0]-	Even LVDS Signal -	51	Reserved	Please leave it open
26	RE[0]+	Even LVDS Signal +			

Note:

1. All GND (ground) pins should be connected together and should also be connected to the LCD's metal frame.
All Vcc (power input) pins should be connected together.
2. For Pin 10, 27 and 28, panel will not damage if negligently connect these pins to high or low



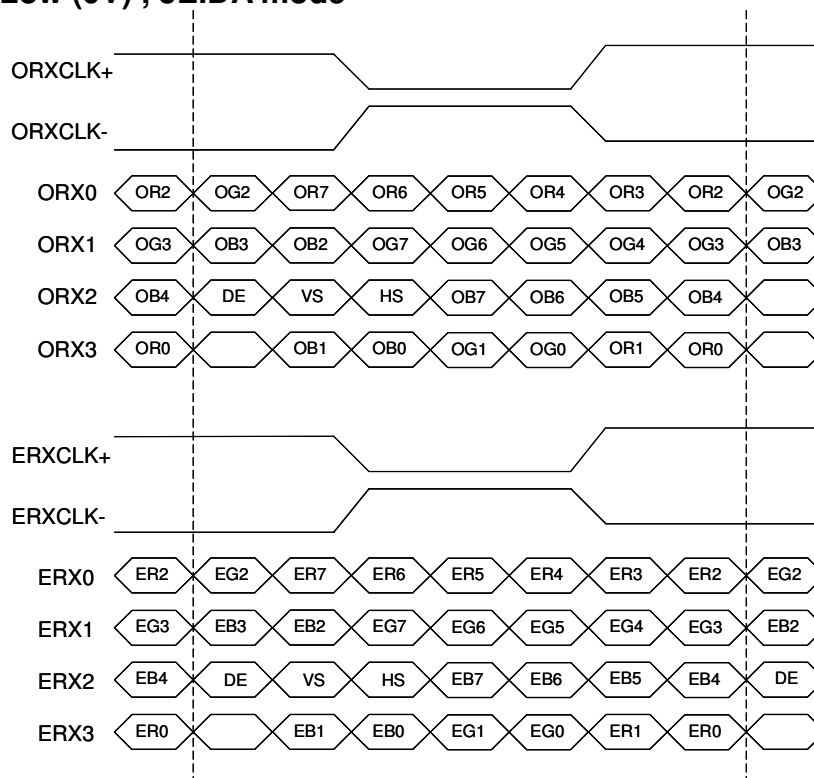
LVDS Option = High/Open, NS mode



Note:

- ◆ Odd data is the first priority.
- ◆ First data is odd.

LVDS Option = Low (0V) , JEIDA mode





3-3 Signal Timing Specifications

This is the signal timing required at the input of the User connector. All of the interface signal timing should be satisfied with the following specifications for the proper operation.

* Timing Table

Signal	Item	Symbol	Min.	Typ.	Max.	Unit
Vertical Section	Period	Tv	1090	1125	1480	Th
	Active	Tdisp(v)	1080			Th
	Blanking	Tblk (v)	10	45	400	Th
Horizontal Section	Period	Th	1030	1100	1325	Tclk
	Active	Tdisp(h)	960			Tclk
	Blanking	Tblk (h)	70	140	365	Tclk
LVDS Clock	Frequency	Fclk (1/Tclk)	50	74.25	82	MHz
Vertical Frequency	Frequency	Fv	47	60	63	Hz
Horizontal Frequency	Frequency	Fh	60	67.5	73	kHz

Notes:

1.) Display position is specific by the rise of DE signal only.

Horizontal display position is specified by the falling edge of 1st DCLK right after the rise of ENAB, is displayed on the left edge of the screen.

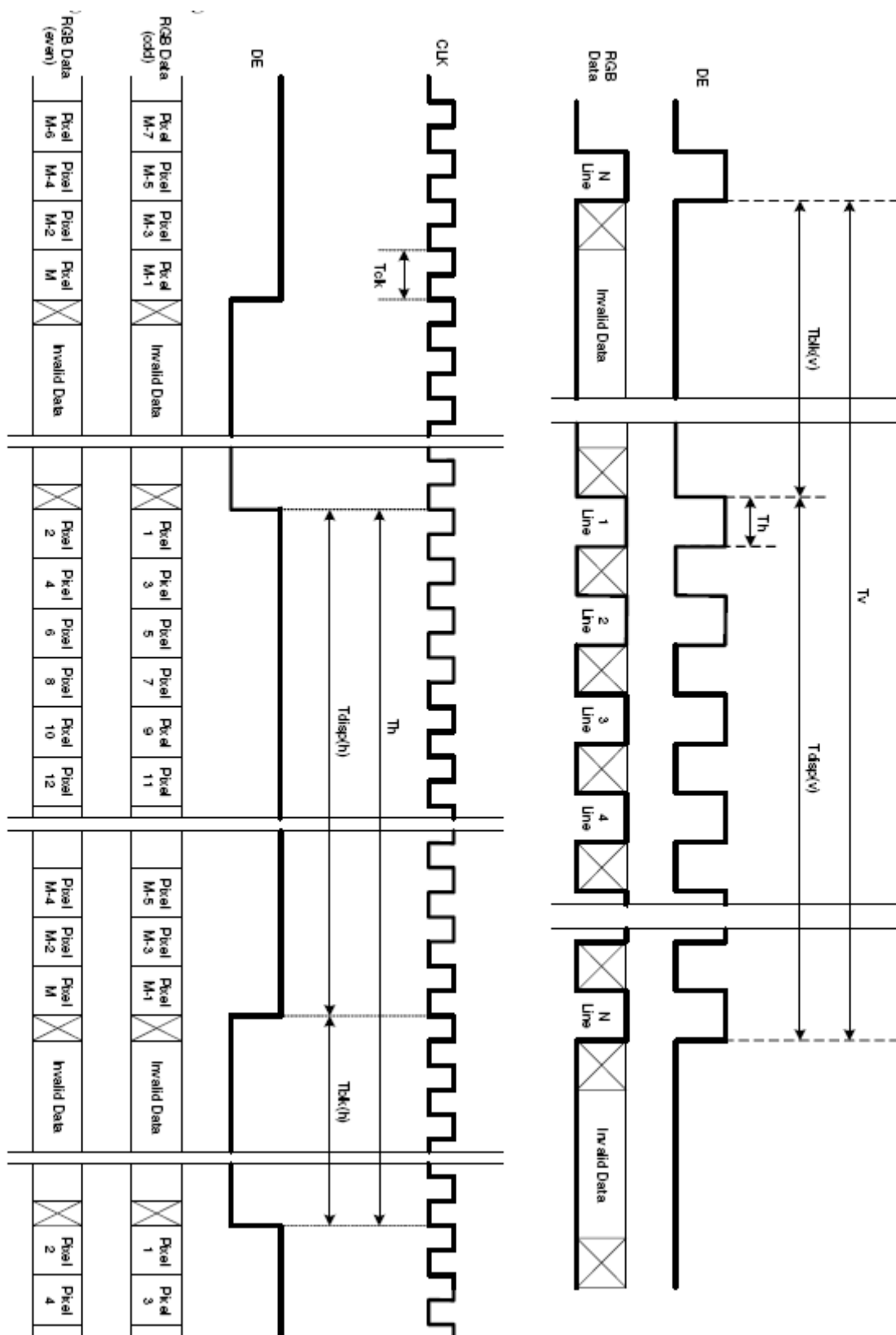
Vertical display position is specified by the rise of DE after a “Low” level period equivalent to eight times of horizontal period. The 1st data corresponding to one horizontal line after the rise the of ENAB is displayed at the top line of screen.

3.) If a period of DEB “High” is less than 1920 DCLK or less than 1080 lines, the rest of the screen displays black.

4.) The display position does not fit to the screen if a period of DE “High” and the effective data period do not synchronize with each other



3-4 Signal Timing Waveforms





3-5 Color Input Data Reference

The brightness of each primary color (red, green and blue) is based on the 8 bit gray scale data input for the color; the higher the binary input, the brighter the color. The table below provides a reference for color versus data input.

* COLOR DATA REFERENCE

Color		Input Color Data																							
		RED								GREEN								BLUE							
		MSB				LSB				MSB				LSB				MSB				LSB			
		R7	R6	R5	R4	R3	R2	R1	R0	G7	G6	G5	G4	G3	G2	G1	G0	B7	B6	B5	B4	B3	B2	B1	B0
Basic Color	Black(L0)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(255)	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Green(255)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	Blue(255)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	Cyan	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Magenta	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	Yellow	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	White(L255)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
RED	RED(000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED(001)	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

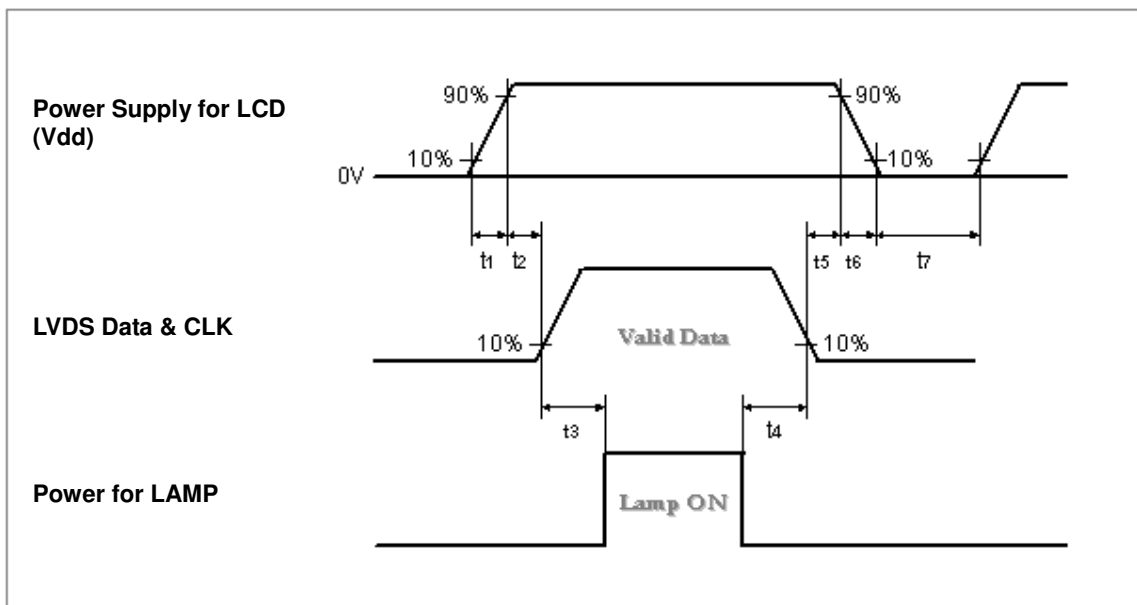
	RED(254)	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED(255)	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GREEN	GREEN(000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GREEN(001)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0

	GREEN(254)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0
	GREEN(255)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
BLUE	BLUE(000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	BLUE(001)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1

	BLUE(254)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0
	BLUE(255)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1

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3-6 Power Sequence



Parameter	Values			Unit Min.
	Min.	Typ.	Max.	
t1	0.4	-	30	ms
t2	0.1	-	50	ms
t3	300	-	-	ms
t4	10	-	-	ms
t5	0.1	-	50	ms
t6	-	-	300	ms
t7	500	-	-	ms

Apply the lamp voltage within the LCD operating range. When the backlight turns on before the LCD operation or the LCD turns off before the backlight turns off, the display may momentarily become abnormal.

Caution:

The above on/off sequence should be applied to avoid abnormal function in the display. In case of handling, make sure to turn off the power when you plug the cable into the input connector or pull the cable out of the connector.

4. Optical Specification

Optical characteristics are determined after the unit has been 'ON' and stable for approximately 30 minutes in a dark environment at 25°C. The values specified are at an approximate distance 50cm from the LCD surface at a viewing angle of Φ and θ equal to 0°.

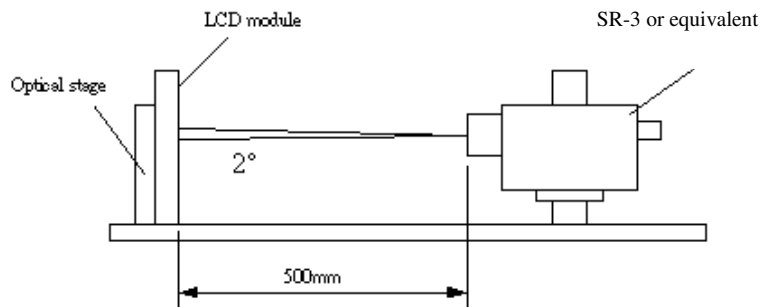


Fig.4-1 Optical measurement equipment and method

Parameter		Symbol	Value			Unit	Note
			Min.	Typ.	Max.		
Contrast Ratio		CR	3200	4000			1,2
Surface Luminance, white		LWH	400	500		cd/m ²	1,3
Luminance Variation		δ_{WHITE}		1.30	1.3		1,4
Cell Transparency		Tr		4.0		%	1,7
Response Time		T _γ		6.5		ms	1,5
Color Gamut				72		%	1
Color Coordinates	RED	R _x	Typ.-0.03	0.64	Typ.+0.03		1
		R _y		0.33			1
	GREEN	G _x		0.29			1
		G _y		0.60			1
	BLUE	B _x		0.15			1
		B _y		0.06			1
	WHITE	W _x		0.28			1
		W _y		0.29			1
Viewing Angle by ELDIM	x axis, right($\varphi=0^\circ$)	θ_r		89		Degree	1, 6
	x axis, left($\varphi=180^\circ$)	θ_l		89		Degree	1, 6
	y axis, up($\varphi=90^\circ$)	θ_u		89		Degree	1, 6
	y axis, down ($\varphi=0^\circ$)	θ_d		89		Degree	1, 6

Note :

1, Optical data above is measured from AUO T315HW02 V0 module.

2, Contrast Ratio (CR) is defined mathematically as:

$$\text{Contrast Ratio} = \frac{\text{Surface Luminance of } L_{\text{on1}}}{\text{Surface Luminance of } L_{\text{off1}}}$$

3, Surface luminance is luminance value at point 1 across the LCD surface 50cm from the surface with all pixels displaying white. From more information see FIG 4-2. When VDDb=24V, IDDB=5A, LWH=Lon5, Where Lon5 is the luminance with all pixels displaying white at center 5 location.

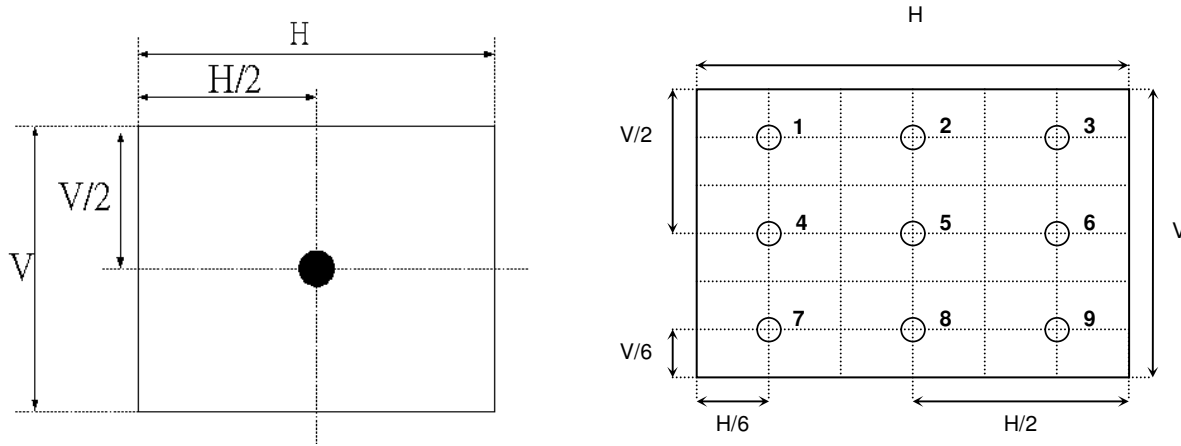


Fig.4-2 Optical measurement point

4, The variation in surface luminance, δ_{WHITE} is defined (center of Screen) as:

$$\delta_{\text{WHITE(9P)}} = \frac{\text{Maximum}(L_{\text{on1}}, L_{\text{on2}}, \dots, L_{\text{on9}})}{\text{Minimum}(L_{\text{on1}}, L_{\text{on2}}, \dots, L_{\text{on9}})}$$

5, Response time T_y is the average time required for display transition by switching the input signal for five luminance ratio (0%,25%,50%,75%,100% brightness matrix) and is based on $f_v=60\text{Hz}$ to optimize.

	0%	25%	50%	75%	100%
0%		t0%-25%	t0%-50%	t0%-75%	t0%-100%
25%	t25%-0%		t25%-50%	t25%-75%	t25%-100%
50%	t50%-0%	t50%-25%		t50%-75%	t50%-100%
75%	t75%-0%	t75%-25%	t75%-50%		t50%-100%
100%	t100%-0%	t100%-25%	t100%-50%	t100%-75%	

6, Viewing angle is the angle at which the contrast ratio is greater than 10. The angles are determined for the horizontal or x axis and the vertical or y axis with respect to the z axis which is normal to the LCD surface. For more information see FIG 4-3.

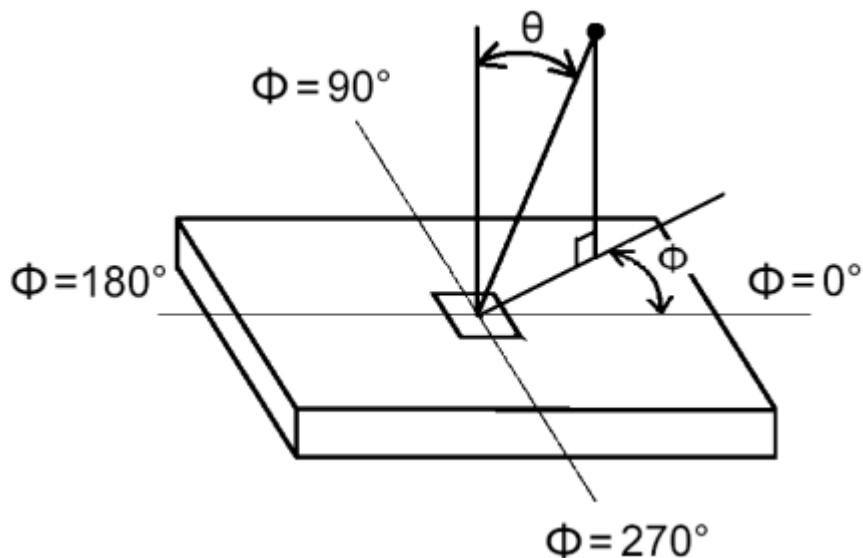


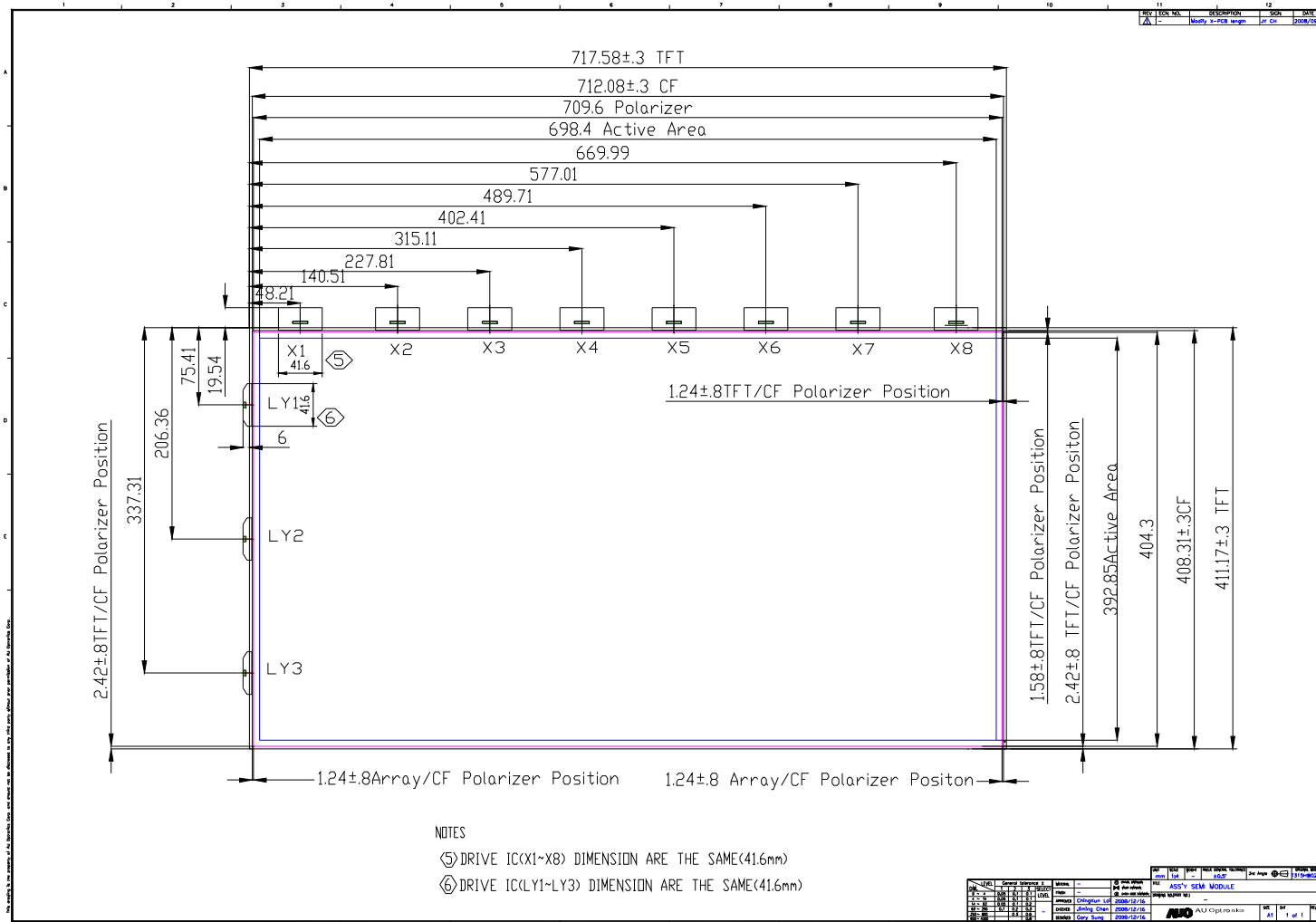
Fig.4-3 Viewing Angle Definition

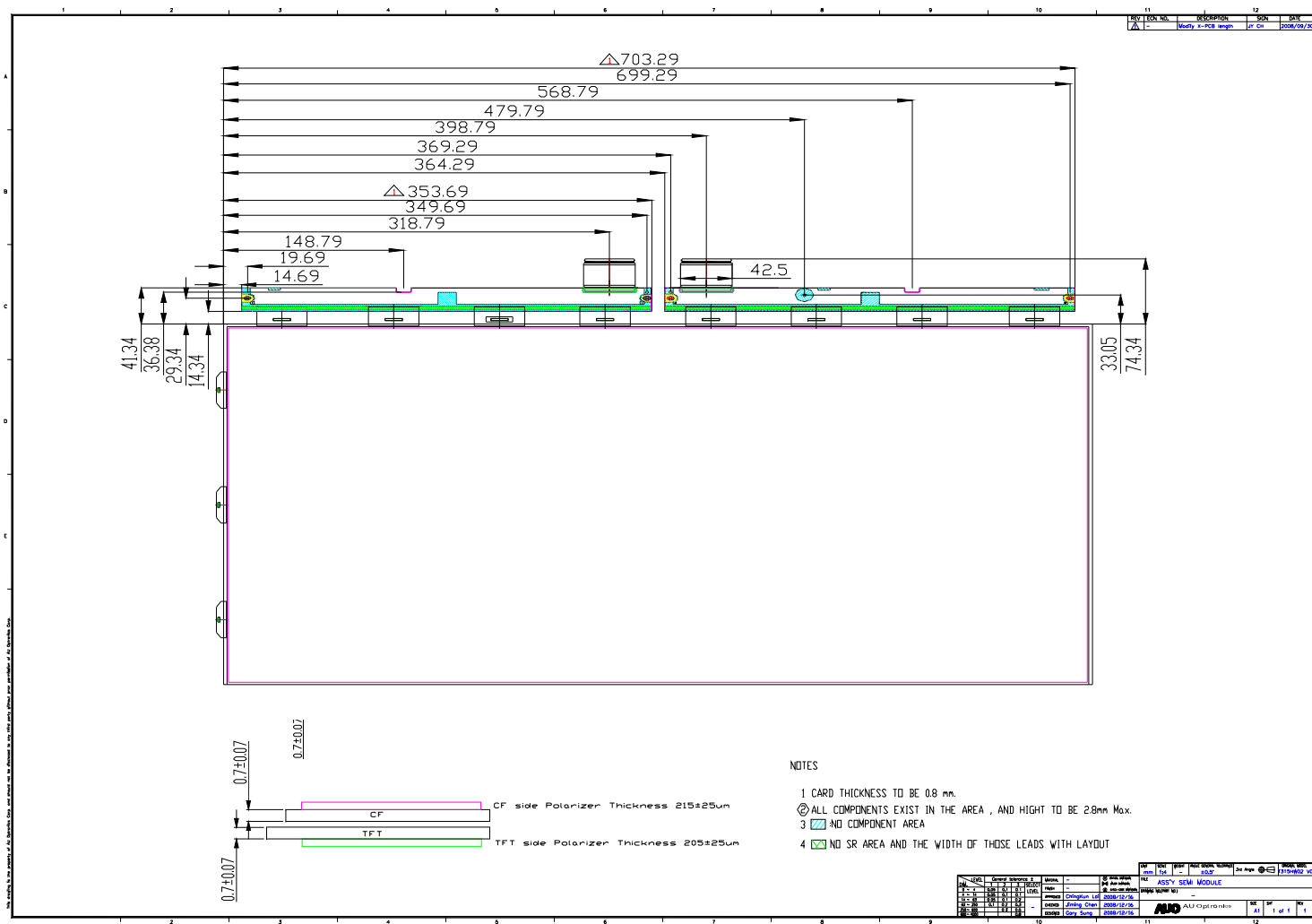
7, Cell Transparency (Tr) is the ratio of module luminance at center point of active area to backlight luminance at center point. Tr is defined as, $Tr (\%) = (\text{Module luminance} / \text{Backlight luminance}) \times 100$. Where the film structure of backlight should not include any reflective type of prism such as DBEFD, and Measurement of module or backlight luminance should be under the same condition of BLU power and no any lamp mura is found.



5. Mechanical Characteristics

* Front View (Open Cell 2D Drawing)







6. AUO's Basic BLU Optical Performance and Film structure

The center Luminance & Chromaticity of AUO's BLU

Item		Typ.	Unit	Note
Central Chromaticity	x	0.265	-	CIE 1931
	y	0.245	-	

7. Reliability

Environment test condition

	Test Item	Q'ty	Condition
1	High Temperature Storage	3	60°C 300 hrs
2	Low Temperature Storage	3	-20°C , 300 hrs
3	High Temperature Operation	3	50°C , 300 hrs
4	Low Temperature Operation	3	-5°C , 300 hrs
5	Vibration (With carton)	3	Random wave (1.5 Grms 10~200Hz) 30mins / Per each X.Y.Z axes
6	Drop (With carton)	3	Height: 38.1cm 1 corner, 3 edges, 6 surfaces (ASTMD4169-I)

Note: Test Item 1~4 RA tests are done on AUO T315HW02 V0 Module.

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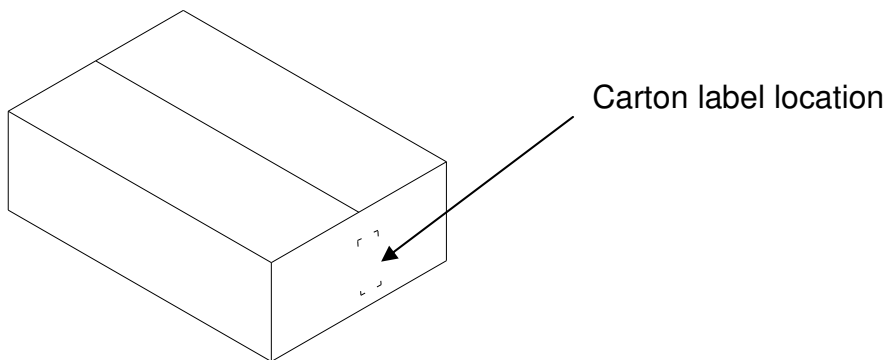
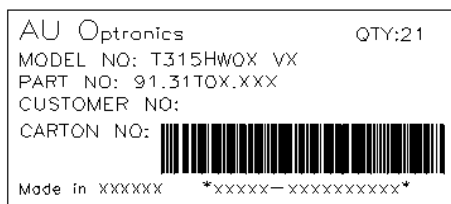
8. Packing

Open cell shipping label (35*7mm)



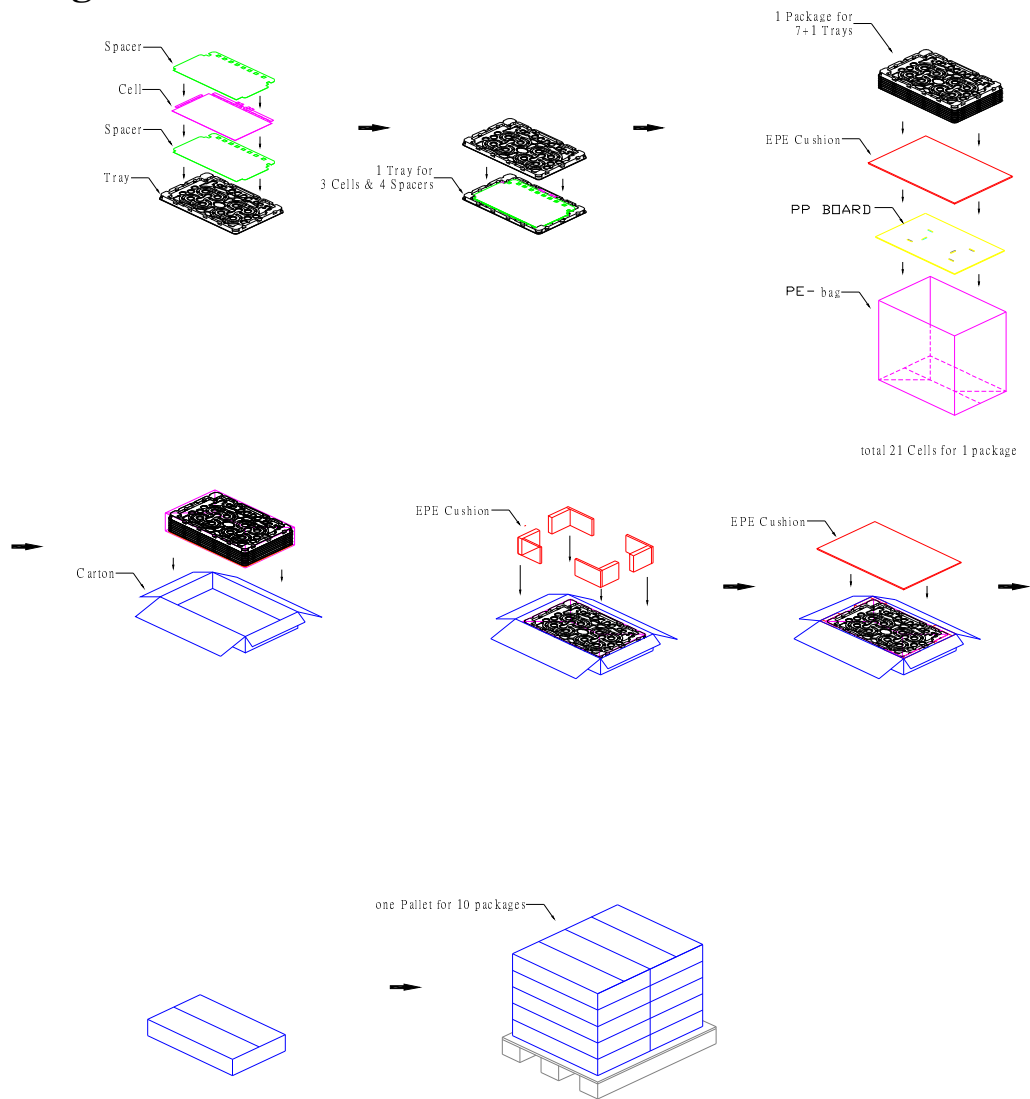
1. S/N Number
2. Grade
3. Manufacture Fab.
4. Last 2 digits of AUO P/N E0
5. Manufactured date
6. Model name

Carton Label:





Packing Process :



Carton **970(L)mm*588(W)mm*280(H)mm**

Pallet : **1180mm*980mm*138mm**

- (1) By Air : (2 *1) * 5 layers, 10box per pallet, total 210 pcs open cell per pallet
- (2) By Sea : (2 *1) * 5layers, 10box per pallet, total 210 pcs open cell per pallet

Please pay attention to the followings when you use this TFT LCD module.

9-1 MOUNTING PRECAUTIONS

- (1) You must mount a module using holes arranged in four corners or four sides.
- (2) You should consider the mounting structure so that uneven force (ex. Twisted stress) is not applied to module. And the case on which a module is mounted should have sufficient strength so that external force is not transmitted directly to the module.
- (3) Please attach the surface transparent protective plate to the surface in order to protect the polarizer. Transparent protective plate should have sufficient strength in order to resist external force.
- (4) You should adopt radiation structure to satisfy the temperature specification.
- (5) Acetic acid type and chlorine type materials for the cover case are not desirable because the former generates corrosive gas of attacking the polarizer at high temperature and the latter causes circuit break by electro-chemical reaction.
- (6) Do not touch, push or rub the exposed polarizers with glass, tweezers or anything harder than HB pencil lead. And please do not rub with dust clothes with chemical treatment. Do not touch the surface of polarizer for bare hand or greasy cloth. (Some cosmetics are detrimental to the polarizer.)
- (7) When the surface becomes dusty, please wipe gently with absorbent cotton or other soft materials like chamois soaked with petroleum benzene. Normal-hexane is recommended for cleaning the adhesives used to attach front/ rear polarizers. Do not use acetone, toluene and alcohol because they cause chemical damage to the polarizer.
- (8) Wipe off saliva or water drops as soon as possible. Their long time contact with polarizer causes deformations and color fading.
- (9) Do not open the case because inside circuits do not have sufficient strength.

9-2 OPERATING PRECAUTIONS

- (1) The device listed in the product specification sheets was designed and manufactured for TV application
- (2) The spike noise causes the mis-operation of circuits. It should be lower than following voltage:
 $V=\pm 200\text{mV}$ (Over and under shoot voltage)
- (3) Response time depends on the temperature. (In lower temperature, it becomes longer..)
- (4) Brightness depends on the temperature. (In lower temperature, it becomes lower.) And in lower temperature, response time (required time that brightness is stable after turned on) becomes longer.
- (5) Be careful for condensation at sudden temperature change. Condensation makes damage to polarizer or electrical contacted parts. And after fading condensation, smear or spot will occur.
- (6) When fixed patterns are displayed for a long time, remnant image is likely to occur.



(7) Module has high frequency circuits. Sufficient suppression to the electromagnetic interference shall be done by system manufacturers. Grounding and shielding methods may be important to minimize the interface.

9-3 ELECTROSTATIC DISCHARGE CONTROL

Since a module is composed of electronic circuits, it is not strong to electrostatic discharge. Make certain that treatment persons are connected to ground through wrist band etc. And don't touch interface pin directly.

9-4 PRECAUTIONS FOR STRONG LIGHT EXPOSURE

Strong light exposure causes degradation of polarizer and color filter.

9-5 STORAGE

When storing modules as spares for a long time, the following precautions are necessary.

- (1) Store them in a dark place. Do not expose the module to sunlight or fluorescent light. Keep the temperature between 5°C and 35°C at normal humidity.
- (2) The polarizer surface should not come in contact with any other object. It is recommended that they be stored in the container in which they were shipped.

9-6 HANDLING PRECAUTIONS FOR PROTECTION FILM

- (1) The protection film is attached to the bezel with a small masking tape. When the protection film is peeled off, static electricity is generated between the film and polarizer. This should be peeled off slowly and carefully by people who are electrically grounded and with well ion-blown equipment or in such a condition, etc.
- (2) When the module with protection film attached is stored for a long time, sometimes there remains a very small amount of glue still on the Bezel after the protection film is peeled off.
- (3) You can remove the glue easily. When the glue remains on the Bezel or its vestige is recognized, please wipe them off with absorbent cotton waste or other soft material like chamois soaked with normal-hexane.